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IN THE UNITED STATES DISTRICT COURT FOR THE
SOUTHERN DISTRICT OF NEW YORK

MIDWAY MANUFACTURING COMPANY: Deposition of
vs. : Ralph Baer
THE MAGNAVOX COMPANY : FIFTH DAY
and :
SANDERS ASSOCIATES, INC. : 74C1030

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
THE MAGNAVOX COMPANY, et al :

vs. :
BALLY MANUFACTURING :
CORPORATION, et al :

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF CALIFORNIA

ATARI, INC. :
vs. :
THE MAGNAVOX COMPANY :
and :
SANDERS ASSOCIATES, INC. :

FILED

OCT - 8 1976

H. STUART CUNNINGHAM, M. CLERIC
UNITED STATES DISTRICT COURT

ERNEST W. NOLIN & ASSOCIATES

General Stenographic Reporters

369 ELGIN AVE., MANCHESTER, N. H. 03104

TELEPHONE: 623-6906

ORIGINAL

Continued deposition taken
pursuant to subpoena and notice at the Sanders Associates,
Inc.; Headquarters, Spit Brook Road; Nashua, New
Hampshire; Tuesday, January 6, 1976; commencing at
ten o'clock in the forenoon.

PRESIDENT:

Q. (Interrogatories by) For Midway Manufacturing Company, Bally Manufacturing Corporation and Empire:

previous portion of Donald L. Welsh, Esq., and
A. Sidney Katz, Esq., 135 South
taken in November at LaSalle Street, Chicago,
Illinois.

For Atari, Inc.:

Thomas O. Harbert, Esq.,
160 Sansome Street, 15th Floor,
San Francisco, California.

For Sanders Associates, Inc.,
and Magnavox Company:

James T. Williams, Esq.,
77 West Washington Street,
Chicago, Illinois.

For Sanders Associates:

Louis Etlinger, Esq., and
Richard I. Seligman, Esq.,
Daniel Webster Highway, South,
Nashua, New Hampshire

For the Magnavox Company:

Thomas A. Briody, 1700 Magnavox
Way, Fort Wayne, Indiana

sitting them around on Stenotype Reporter:

Q. Does it include anything Ronald J. Hayward

A. It includes a pictorial showing the layout and
RALPH BAER

vertical positioning controls and was sworn in as a witness, having been previously sworn, was further examined and continued his testimony as follows:

Q. (Interrogatories by Mr. Welsh.) Yes, I believe you

Q. We just received a copy of the transcript of the previous portion of this deposition which was taken in November and I have just had a chance to glance at it so it is possible that we may touch upon some ground that we have covered before. I

A. Will try to avoid that, but I hope you will bear with me. You were sworn in previously by this particular reporter and for the purposes of this deposition and you still remain under oath. Now, when we adjourned, I believe we had just commenced

Q. discussing Exhibit No. 16-4A, which I will now place in front of you. Could you tell us, please, if you recognize it and what is that document?

A. A block diagram of a basic TV game, ant, Exhibit 16-4A

Q. What do you mean by basic TV game?

A. It has the elements for generating symbology and

A. moving them around on ^athe raster scan display. *

3 Q. Does it include anything else? as it not?

A. It includes a pictorial showing horizontal and
9 Q. vertical positioning controls and how they apply
to the circuit electrically. How they are applied
A. to the circuit electrically and physically.

40 Q. Perhaps my question was indefinite, I believe you

A. were discussing previously what constituted the

11 Q. basic TV game and you indicated elements for it?

A. generating symbology and moving them around across

12 Q. raster scan display; does the basic TV game, as

A. you use the term, include anything else?

13 A. Yes, the necessary presence of vertical and

A. horizontal sync generation. And in this case an

14 Q. RF oscillator tunable to Channel 2 to 5 so as to
permit inserting the signal to a TV set antenna

A. terminals. Schematic representation that accompanies

5 Q. Does the basic TV game as depicted here include
anything else? through before.

15 A. No. were referring to Exhibits 9-2 through 9-10?

6 Q. Do you know who prepared this document, Exhibit 16-4A?

A. I did. MR. WELSH: May I have that

7 Q. When did you prepare it? one read as to what

A. 6 September, '66.

Q. That is the date that it bears, is it not?

A. Yes.

Q. Is that your signature above the date in the lower right-hand corner of the document?

A. Yes, it is.

Q. Did you place your signature there on that date?

A. I did.

Q. Do any other signatures appear on the document?

A. Yes, Robert Solomon's in the lower left-hand corner.

Q. Did you see him place his signature on that document?

A. I don't remember.

Q. Is there a date next to his signature?

A. Yes, 6 September, '66.

Q. What occasioned your preparation of this document, Exhibit 16-4A?

A. It is a schematic representation that accompanies the written material to which it is appended that we have gone through before.

Q. You were referring to Exhibits 9-2 through 9-10?

A. That is right.

MR. WELSH: May I have that answer next to the last one read as to what

occasioned the preparation of this document?

produces a video signal. In addition, a sync generator, the outputs of which are summed with the video signal to derive a composite video signal. (Whereupon, the requested block diagram shows the video and sync signals, answer was read back by the reporter.)

with the video signal to derive a composite video signal.

16 Q. Does Exhibit 16-4A have any relation to a particular portion of Exhibit - of the pages of Exhibits 9-2 through 9-10; and I will hand you that exhibit, if you wish to refer to it?

A. Yes, it specifically relates to 2A, 2B, 2E, 2H.

17 Q. Exhibits 9-2 through 9-10 do not contain any reference to accompanying drawings, do they?

A. No, they do not.

18 Q. Referring to Exhibit 16-4A, could you tell us what are the various elements depicted there and how they operate in the basic TV game?

21 A. Certainly. Its basic purpose is to create two rectangular symbols on the screen. The block diagram shows two independent delay multivibrators, one for creating and defining the width and one for defining the height for each symbol and another multi vibrator for the other symbol. In addition, it shows a four-input And-gate which sums the

*
*

outputs of these four delay multivibrators and produces a video signal. In addition to that, the block diagram shows the vertical and horizontal sync generator, the outputs of which are summed with the video signal to derive a composite video and ^{sync} signal shown schematically in the upper right-hand corner of 16-4A which are then in turn applied to an RF oscillator.

Q. Do the delay multivibrators have any identifying

A. labels?

A. Yes, they do. They are labeled delay MV or DMV and specifically labeled as to whether they provide a vertical or horizontal wave form.

Q. That is in the lower left quadrant of the drawing?

A. Yes. ~~other two rectangles in the lower, left~~

Q. Do I understand correctly that there are two

A. dots generated?

A. Dots or symbols or rectangles, that is correct.

Q. And which of the boxes - ~~are~~ any identifying

A. Rectangles in the lower, left quadrant of

A. Exhibit 16-4A, are used or were intended for use for one of the dots, the first one. If you

Q. notice, there are two numerals, proceeded by shaped

a number saying No. 1 and No. 2 above the two top-

A. most blocks representing the vertical and horizontal

28 Q. delay multivibrators. Those constitute spot No. 1.

One of the spots. The two delay multivibrators

Below that pair constitute the vertical and the

horizontal delay multivibrators required to make

A. spot symbol No. 2. I have problems with your

23 Q. So spot symbol No. 1 is generated using delay

multivibrators in the No. 1 above vert? A. there

A. Right. no input And-gates shown, dashed in below

24 Q. Plus DMV with (hor) in the rectangle and No. 2

appearing above that, is that correct? in dash lines

A. That is correct. ^{to} generators and those two And-

25 Q. And Spot No. 2 was intended to be generated using

the other two rectangles in the lower, left

portion of Exhibit 16-4A? this would be a

A. That is right. ^{to} sum in the subcarrier and that

26 Q. Does the And-gate which you referred to as receiving

the outputs of the DMV's have any identifying

29 Q. label? the time you prepared Exhibit 16-4A, had

A. No, it doesn't, it is simply a standard And-gate

symbol?

27 Q. There appears to be - is that the umbrella-shaped

Q. portion in the center of the exhibit? any of the

A. Yes, that is correct.

Q. Now, there appears to be a legend with an arrow to pointing toward that with the legend stating on the chroma gates to chroma gen., could you describe that? ~~the~~ schematics predate or antedate the 16-4A,

A. Yes, I think you may have problems with your

Q. Xerox copy. Could I see that, please? No, it shows all right on there. If you notice, there are two input And-gates shown, dashed in below

A. that four-input And-gate and one each of the inputs to those And-gates again, shown in dash^{ed} lines

A. labeled: ^{"To} ~~two~~ chroma generators, and those two And-

Q. ^{gate} ~~generators~~ are labeled: ^{"To} ~~two~~ chroma gates. That was simply to indicate that if we wanted to color

information on the screen, this would be a convenient point to sum in the subcarrier and that

information required to create, say, a colored background, which indeed we did shortly ^{there} after.

Q. Now, at the time you prepared Exhibit 16-4A, had you constructed a device as depicted on that

Q. exhibit? ~~you~~ after having referred to the other

A. No, sir. ~~s~~ including specifically Exhibit 9-10A,

30 Q. Had you constructed any circuitry for any of the delay multivibrators? Exhibit 16-4A, you had

A. I would have to refresh my memory by reference to some of the other schematics and other data on the table here to check on whether the dates of some of the schematics predate or antedate the 16-4A, I don't remember. time to look through them.

31 Q. I would like to have you do that. Do you see something in particular here that you are referring to? That would be fine.

32 A. Yes. I reviewed the other documents which have been

Q. You are referring to, I believe, Exhibit 9- -

A. 9-10. or?

33 Q. I believe the last page of Exhibit 9-2 ends in of 9-10, could the reporter please mark this as a

34 Q. separate sheet that the witness just referred to as 9-10A? September 6, 1960?

A. I don't recall; it was marked for

35 Q. (Whereupon, Exhibit 9-10A was the apparatus depicted in the block diagram was marked for intended to do anything else other than produce the composite signal in the upper, right-hand portion identification.)

36 Q. Could you after having referred to the other

A. documents including specifically Exhibit 9-10A,

Q. can you answer the question as to whether as of

A. the time you prepared Exhibit 16-4A, you had or constructed specific circuitry for any of the delay multivibrators? like a chess board, could be played

Q. with the unit and of MR. WILLIAMS: And, Mr. Baer, can if you think ^{simplified} any other documents would help you,

Q. you may take your time to look through them.

set forth in paragraph THE WITNESS: Maybe I better

A. do that, although I believe I can answer it.

Q. Does Exhibit 16-4A in MR. WELSH: That would be fine.

Q. Having reviewed the other documents which have been

A. marked as exhibits, are you able to answer the

Q. question? that?

A. The answer is no, no hardware had been built as of that date. of the symbols on the screen by the

Q. Did you have any specific hardware in mind at that

Q. date of September 16, 1966? Exhibit 16-4A?

A. I don't recall. o'clock on the page in the pictorial

Q. Was the apparatus depicted in the block diagram intended to do anything else other than produce

Q. the composite signal in the upper, right-hand portion

A. of Exhibit 16-4A?

A. Yes, it was intended to play games with.

38 Q. Could you describe how it was used to do that?

A. We referred to 9-2, some subheadings in 9-2 of paragraph 2 before, which indicate that such things

45 Q. as board games, like a chess board, could be played

A. "with the unit and clearly with two checkers you can play a ^{simplified} ~~simple five~~ form of checkers. of years in

39 Q. These are the games you have referred to as set forth in paragraphs 2A, 2B, 2E and 2H?

A. Yes, sir. the bottom of a window behind which the

40 Q. Does Exhibit 16-4A include any representations of any device to be manipulated by a player?

A. Yes, it does. the two knobs.

41 Q. What is that? intended to be players to use the

A. Four controls are shown for horizontal and vertical

A. positioning of the symbols on the screen by the

47 Q. two participant players.

42 Q. Where is that exhibit in Exhibit 16-4A?

43 A. Roughly at four o'clock on the page in the pictorial showing a horizontal view of a raster scan display CRT surrounded by four knobs labeled V and H.

43 Q. Is there also a label for that entire thing?

A. Yes, there is, lines emanating from the circles which

44 Q. What is that? labeled V and H. In the standard fashion

A. Just above it, a label with an arrow pointing to the pictorial, and it says "Etch-A-Sketch" mechanisms, two each, ganged to pot under each knob.

45 Q. What does "Etch A Sketch" mean?

A. "Etch A Sketch" is a tradename for a toy that has been on the market for quite a number of years in which a stylus can be manipulated in both a horizontal and vertical direction by turning two knobs at the bottom of a window behind which the stylus moves. The stylus, in moving, creates patterns, makes lines in effect on the screen in response to manipulating the two knobs.

46 Q. There were intended to be players to use the apparatus depicted in Exhibit 16-4A?

A. You mean human players, participants?

47 Q. Yes.

A. Certainly.

48 Q. Could you describe how many there were and what they were intended to do and what was intended to happen?

A. Yes. If you look again at the pictorial, you see dashed lines emanating from the circles which are knobs labeled V and H. In the standard fashion

A. of depicting the relationship between a control and the controlled element on ~~this~~ schematic diagrams you will see that these controls, knobs, mechanically rotate controls attached to the delay multivibrators, the topmost of which is labeled delay adjustment.

You will see that the vertical knob controls the delay adjustment of the vertical delay multivibrator and the horizontal knobs - plural, that is - control the delay potentiometers of the horizontal delay multivibrators which results in vertical and horizontal positioning of the displayed symbols on the screen.

Q. So each player was intended to move one symbol to different positions on the screen?

A. Yes.

Q. Could you describe more specifically how the game of paragraph 2A on Exhibit 9-3 was intended to be played using the apparatus depicted in Exhibit 16-4A?

A. No, I have a problem with that. I anticipated an element that isn't on this drawing. You will have to strike 2A from the list of pertinent games.

Q. And what element was that that was not shown on Exhibit 16-4A?

A. apparatus such as that depicted in Exhibit 16-4A, each symbol that was movable would have required two knobs, would it not?

A. Yes, sir.

56 Q. Did you contemplate more than two movable symbols?

A. I don't remember, sir.

57 Q. In the playing of the board game of paragraph 2B of Exhibit 9-3, was it contemplated that the images or any portions of them would ever occupy

61 Q. the same space on the television screen?

A. Yes, they might. There is no technical reason why

A. they shouldn't.

58 Q. Was anything intended to happen in the event that occurred?

A. Mr. Welsh, I would have to refresh my memory by looking through notes here to see whether coincidence

A. This doesn't help on that. There is no indication of that here.

59 Q. There is nothing shown on Exhibit 16-4A, is there, to indicate that you intended anything to occur upon, I believe you referred to it, as coincidence?

A. No, there isn't.

60 Q. What do you mean by coincidence?

A. The superposition in space and therefore electrically in time of part or all of the composite wave form of two symbols, dots.

MR. WELSH: Would you read that back to me, please?

(Whereupon, the previous

answer was read back

by the reporter.)

Q. Did you ever build or construct apparatus like that of Exhibit 16-4A using an "Etch A Sketch" mechanism?

A. No, never, sir.

Q. Is there anything on the document that shows that the rectangle with the images in the four o'clock position on Exhibit 16-4A is a raster scan CRT rather than a part of an "Etch A Sketch" mechanism?

A. Well, the presence of the RF oscillator and the arrow pointing to the words "to antenna-TV set" right above the pictorial and the title of the page in the lower right-hand corner, TV mode, data entry device, makes it pretty obvious that what we are looking at is a CRT screen.

Q. After you prepared Exhibit 16-4A, what was the

next thing which you or anybody else did in the furtherance of your TV game development?

A. We built some experimental hardware. Rather I built some experimental hardware.

Q. Do any of the documents which have been produced and marked here relate to that construction?

A. Yes, they do, Mr. Welsh.

Q. Would you tell us which ones starting with the earliest?

A. Documents 9-11 through 9-22 trace through this early work with 9-11 being the first specific date; namely, December 6, '66, in which I depict the basic method for moving a symbol on a screen, in this case horizontally.

Q. Well, going back for a moment to Exhibit 16-4A, would you tell us how the And-gate operates?

A. That is, the large umbrella in the center of the exhibit.

Q. It appears as a dark line in the center of

A. Actually in this context, this And-gate really functions as a video summer, probably more

Q. correctly should have been drawn as an Or-gate or as a summer.

Q. If it were just an And-gate as you described it

Q. earlier, would it permit the operation that you indicated was desired? symbol horizontally?

A. No, it would not. ^{ing a horizontal sync pulse}

Q. What else would be needed? ^{ator and adjusting that}

A. If it were just an and gate, there would be an ^{through} output only when the dots are superimposed, which was certainly not intended. ^{to which composite}

Q. What else would be needed? ^{allows moving the}

A. An Or-gate or a summer in place of the and gate. *

Q. All right; now, running to Exhibits 9-11 through 9-22, you were referring to Exhibit 9-11 which you

A. indicated depicts a basic method for moving a

Q. symbol on a screen, in this case horizontally;

A. what kind of a symbol was intended to be moved

Q. there? ^{prepare that exhibit?}

A. An elongated dot or a bar shown in the pictorial

Q. in the upper right-hand corner of the page, and

Q. Now, that appears as a dark line in the center of

A. a rectangle?

A. That is right, sir. ^{exhibit on that date?}

Q. And does that extend throughout the height of

Q. the screen? ^{months after the date of September 5,}

A. Yes, it does. ^{of Exhibit 16-4A?}

- 73 Q. What does Exhibit 9-11 show for achieving the
 80 Q. purpose of moving the symbol horizontally? TV game
 A. It shows that having a horizontal sync pulse
 A. applying it to a multivibrator and adjusting that
 81 Q. delay multivibrator and applying the output of the
 A. delay multivibrator ^{through} a series of stages to the ~~pick-off~~ *
 modulator of an RF oscillator to which composite
 sync has also been applied, allows moving the
 symbol horizontally across the CRT. I don't have to *
 74 Q. Did you actually construct apparatus such as that
 depicted in Exhibit 9-11? ~~board which had at~~
 A. Yes, Mr. Welsh. ~~these delay multivibrators on it.~~
 75 Q. 9-11 bears the date 12-6-66, does it not? after you
 A. Yes, sir. ~~the Heath Kit?~~
 76 Q. Did you prepare that exhibit?
 83 A. Yes, I did. ~~fer to documents 9-11 through 9-17, could~~
 77 Q. Is that your signature in the lower right-hand ~~coup~~
 corner of that exhibit?
 A. It is, sir. 9-12, the first one in the group is a
 78 Q. Did you prepare that exhibit on that date?
 A. Yes, I did. The next one, 9-13, is further detail
 79 Q. That is three months after the date of September 6,
 1966, the date of Exhibit 16-4A? ~~ipient under~~

A. That is correct. panel control position conditions.

Q. Did you do anything in furtherance of your TV game idea during that three-month period? Yes of notes

A. Yes, I did. handwriting with instructions to myself.

Q. What did you do? Things listed from 1 through 7. It

A. I collected some hardware, bits and pieces, and picked up a generator, a Heath Kit generators for use as, a convenient source of sync and also because itillator had an RF oscillator in it so I wouldn't have to build those elements; and then around about this date began to build a breadboard which had at least one of these delay multivibrators on it.

Q. Did you prepare Exhibit 9-11 before or after you had purchased the Heath Kit? I built at that point and

A. After connected to the Heath Kit. 9-12 is a document

Q. Now, you refer to documents 9-11 through 9-22, could you tell us what the other documents in that group are? commonly called the rainbow. Both this page

A. Yes, sir, 9-12, the first one in the group is a block diagram of the Heath Kit TV alignment generator. The next one, 9-13, is further detail on a section of that equipment. 9-14 shows various wave forms generated by that equipment under B

different front panel control position conditions.

9-15 is a continuation of 9-14. 9-16 is a continuation of 9-15. 9-17 is a series of notes made in my handwriting with instructions to myself to do certain things listed from 1 through 7. It took quite a while, Mr. Welsh, to determine what I was doing. When I followed these seven steps, I believe I was experimenting with a chroma oscillator and that is all I can recall. The next exhibit,

Q. 9-18, indicates that I had already built a spot generator because it depicts certain sections out of the IG-62 Heath Kit and a horizontal delay multivibrator in the upper left-hand corner labeled HDMV, which I had already built at that point and interconnected to the Heath Kit. 9-19 is a document which explains how the Heath Kit produces the chroma signal which I call spectral display, it is more commonly called the rainbow. Both this page and the next one explain what goes on in the IG-62 and in the receiver. 9-20 and 21 appear to be Xerox copies of 9-18 and 9-19. Yes, they are, so they are not new material. And finally the last document in this package, 9-22, labeled Figure B

again shows a chroma oscillator on the Heath Kit generator, but tied to an external circuit permitting phase shifting of this chroma signal for the purpose of varying the background ^{hue} ~~color~~ of a raster scan displayed on a colored TV set which we had purchased in the interim. Somehow the document which you labeled 9-10A must have been detached from this series of documents because it is part of that sequence.

84

Q. Does it contain any holes or anything to indicate that it was previously attached?

87

A. Well, it has some staples and some holes and it wasn't stapled to anything. Yes, as a matter of fact it was stapled to the top of this group starting 9-11 and became detached from this. The evidence of the staple holes are on page 9-11.

85

Q. What date does 9-10A bear?

A. 12-10-66, so it is out of sequence.

86

Q. What is Exhibit 9-10A?

A. 9-10A is a schematic showing two delay multivibrators, again interfaced with the horizontal and vertical sync taken from the Heath Kit equipment showing knobs that allowed the delay multivibrator to

89

be adjusted and showing additional interfaces
to the Heath Kit to return the video signal to
generator^{ed} to the modulator and the RF oscillator
in the Heath Kit. a reproduction of a standard
antenna signal from MR. WELSH: Would you read
that answer back, please? : did the work represented
to these documents take place?

(Whereupon, the previous
answer was read back

by the reporter.)

Q. Now, only Exhibits 9-11 and 9-10A of this group
of Exhibits 9-10A through 9-23 bear dates, is that
correct?

A. Yes. No, that is not, sir, they are the only ones
having specific dates, some of the sheets are or
labeled 12-66.

Q. Which ones are those?

A. 9-12, 9-21 bears the date January 4, '67; 9-23 has
a date of February 6, '67.

Q. Did you prepare all of these Exhibits 9-10A through
9-23?

A. All but 9-23 and 9-24.

Q. Who prepared those?

95 A. 9-23 was prepared by R. G. T., I believe that was
96 Bob Tremblay, a technician who worked for me on
the project for a brief period of time early in
'67. And 9-24 is a reproduction of a standard
monochrome signal from a handbook.

91 Q. During what period of time did the work represented
by these documents take place?

97 A. November, December, January, February, '66 through
'67.

92 Q. Now, there is no November date there, is that
correct?

98 A. No, sir, but clearly I couldn't have built this
equipment on December 6 if I hadn't had the Heath
Kit some weeks before and all this analysis of
the Heath Kit done on pages 9-12 through 9-16 or
thereabouts. It certainly took some time to
do it and my guess is that was early December and
maybe late November, somewhere in that period.

93 Q. Where was this work done?

A. In Sanders Canal Street facilities.

94 Q. During your normal working hours?

A. No, mostly after my normal working hours until
a technician came into the picture.

- 95 Q. Who paid for the hardware which you bought?
- 107 A. Sanders. you know that the material of Exhibits 9-13,
- 96 Q. How was that payment arranged?
- A. The Heath Kit was purchased with overhead funds
- A. from my division and the components that were
- A. used to build the hardware were either purchased
- A. in the electronics stockroom at Sanders with, and
- A. overhead funds - refer to vacuum tube No. 8 in the
- 97 Q. Now, in these documents - to 9-12, for example,
- A. you will find VS identifier. MR. WILLIAMS: Excuse me, and
- A. did you finish the answer, Mr. Baer? vertical sync
- A. mixer. So by inference THE WITNESS: Not really, on,
- 98 Q. I am sorry. 10A shows these inputs, so clearly this
- A. They were either bought with overhead funds from
- 101 Q. the stockroom or may have been common parts which
- A. are normally found in a large laboratory in correct?
- A. copious quantities.
- 99 Q. Exhibit 9-10A which bears the date of December 10
- A. and Exhibit 9-11 which bears the date December 6,
- 101 Q. 1966, as I understand it, were attached to the
- A. front of the group of exhibits which has as the
- A. last one Exhibit 9-23; does that arrangement
- 104 Q. of exhibits have any chronological significance?

A. No, sir. to identify a film.

100 Q. How do you know that the material of Exhibits 9-13,
101 14, 15 and 16 was prepared before or after these
102 other exhibits?

A. Because 9-10A shows references to these other
103 pages. For example, the two delay multivibrators
104 are shown as being driven from a V-8, pin 6, and
105 V8, pin 1; these refer to vacuum tube No. 8 in the
106 Heath Kit. If you will go to 9-12, for example,
107 you will find V8 identified as a summer of H and
108 V and sync mixer. Horizontal and vertical sync
109 mixer. So by inference to answer your question,
110 if figure 9-10A shows these inputs, so clearly this
111 material must have preceded 9-10A. *

101 Q. Now, when you say this material, you refer to
102 9-12 which bears the date 12-66, is that correct?

103 A. Yes, sir.

102 Q. When was that date put there?

A. I do not recall.

103 Q. Any particular reason why that date does not have
104 a day as well as the month and year?

A. Probably because the date was added later.

104 Q. Any particular reason for adding the date later?

A. Yes, just to identify a block of activity that was obviously done at that period. It is quite conceivable that that should have been 11-66.

Q. There is no date on any of these documents earlier than December, '66, is that correct?

A. No, sir.

Q. What document bears the earlier date?

A. Of this set, Mr. Welsh, or any documents?

Q. That set.

A. None, 12-6-66 on 9-11 is the earliest date in this

set.

Q. Do I understand correctly, then, that the date 12-66 on Exhibit 9-12 was intended to include the time when the subsequent documents attached

to it were prepared?

A. That is only an assumption on my part.

Q. How much later than December, 1966, did you put that date on Exhibit 9-12?

A. I don't know.

Q. Do you recall the circumstances under which you

put that date there?

A. I believe, Mr. Welsh, we have gone over this before.

Q. There have been a number of times over many

intervening years when we cleaned up or I attempted
 A. to organize the paper work because of the copious
 110 Q. quantity which had accumulated to ~~probably~~ *properly* *
 A. reconstruct it and these pages were put together.

111 Q. Was that at the request of the patent department?

117 A. I believe I testified that the last general

A. cleanup was at the request of the patent department,

118 Q. but certainly we all clean our files periodically

over the years. * the screen? *

112 Q. Was this a part of the last general cleanup?

119 A. I don't recall, sir. chroma generator, is that

correct? *

(Whereupon, a recess

A. The Heath Kit has a chroma generator. *
 was taken.)

120 Q. And is that Heath Kit Model 14-82 referred to on

113 Q. In the work that was represented or is

A. represented by Exhibits 9-10A and 9-11 through

121 Q. 9-23, did you have any particular objectives in
 mind? *ives which you had in mind when you were

A. Yes, sir. * work? *

114 Q. What were they specifically?

122 A. To put symbology on the TV screen and move it

A. around ^{by} ~~with~~ turning knobs. *ed of using color for

115 Q. Does the apparatus represented by these drawings *

Q. of the pattern. The purpose of the color generator is to display, in this case to display a rainbow or a continuous change from the left-hand side of the picture to the right-hand side to get some sort of check on the functions of the color circuits in the TV set and to help in diagnosing problems, if there are problems, in the color section of a TV set. Is that correct?

Q. When you say a rainbow from the left-hand side to the right-hand side, do you mean vertical bars of different colors?

A. They are not really bars, it is a continuous variation of shade from the left-hand side to the right-hand side with the color being uniform in the vertical position and shifting from deep red to the yellow, greens and blues towards the right-hand edge of the screen.

Q. And was it possible with the components of the Heath Kit by itself to shift that rainbow left and right?

A. No, sir, it is not.

Q. Was there any control for shifting the pattern?

A. No, there was not.

- 131 Q. In any direction? is with the controls which were
- A. No, there was no reason for it, to move that pattern
- 132 Q. I thought I understood you to say that the position
- A. controls were used to center a picture with respect
- 133 Q. to the screen? controls by which the pattern could
- A. No, I did not say that. What I said is that when
- a grid pattern such as that generated by the
- A. IG-62 is displayed on a TV set, it allows the controls
- serviceman or individual to reach in back of the set
- and touch up the semiadjustable controls such
- as vertical centering, vertical width, linearity,
- and also horizontally, such as to produce the controls.
- 136 Q. most linear picture on the TV set. For example,
- A. if the controls are misadjusted, you might have
- crowding of the picture on the left-hand side and
- stretching on the right. By displaying a grid
- 137 Q. pattern on the screen, it allows you to adjust at
- A. a glance, telling you if you are crowding or
- 138 Q. stretching on certain parts of the screen.
- 133 Q. So in addition to generating the rainbow pattern,
- it was possible to generate a grid pattern? it
- A. That is correct, that is the purpose of the
- 139 Q. generator. date of January 4, 1967, which

*

- 134 Q. Now, was it possible with the controls which were
manipulatable by the serviceman to move that pattern
A. up, or down, or left or right?
- 140 A. Not by moving the controls on the generator, various
- 135 Q. But there were controls by which the pattern could
A. be moved without addition, all you needed was
141 Q. the Heath Kit and the TV set? determined what wave
A. Well, every TV set has vertical centering controls
A. which allow a small amount of vertical or horizontal
motion to fit the picture within the screen. You
can move any picture up and down by reaching in
142 Q. back of the set and moving semiadjustable controls.
- 136 Q. Referring to Exhibit 9-19 and 9-20, what is that?
A. It is my analysis of how the chroma output in the
A. IG-62 Heath Kit manages to display a rainbow
143 Q. pattern on a TV screen, at the top of Exhibit 9-14;
- 137 Q. You then prepared Exhibits 9-19 and 9-20?
A. Yes, I did.
- 138 Q. And for what purpose did you do that?
A. In order to make sure that having once analyzed
145 Q. it, going on, I wouldn't forget it and I put it
down on paper.
- 139 Q. Up to the date of January 4, 1967, which

- 146 Q. Exhibit 9-19 and 9-20 bears, did you conduct the
A. work on the TV game development alone?
- 147 A. Yes, I did. anything to do with the design of
- 140 Q. On Exhibits 9-16, 9-15 and 9-14, there appear various
A. wave forms, is that correct?
- 148 A. That is right. first become familiar with the Heath
- 141 Q. Could you tell us how you determined what wave
A. forms to draw there?
- 140 A. Yes, I looked at the output wave forms at various
points in the Heath Kit with a scope and drew these
A. wave forms. either, probably not.
- 142 Q. So these are wave forms which are generated or
were generated at various points in the Heath Kit,
A. is that correct? that either.
- 141 A. That is right, we already said that earlier.
- 143 Q. And that is indicated at the top of Exhibit 9-14;
A. for example, by a legend, is it not?
- A. Yes. magazines which engineers read, or at all.
- 144 Q. And what is that legend? idea as to when you first
A. Model IG-62 outputs. say we are talking now about
- 145 Q. Did you also say that Exhibit 9-15 is a continuation
of 9-14? purchased one.
- 141 A. Yes, I did. sketching generators of that type were

around long before the IG-62 came into being, it is just a garden variety TV serviceman's tool. mean

153 Q. The Heath Kit generator?

A. The Heath Kit or any type of crosshatch ~~ed~~ generator similar to the Heath Kit. obtained from the Handbook? *

154 Q. When you say available, for how many years?

A. I don't know, years. It 9-12 which are a series

155 Q. Would you say it was available for years prior to December, 1966? these involve things that you

A. Very likely. with respect to the Heath Kit

156 Q. Do you know?

A. I would have to guess, but the answer would certainly be yes.

157 Q. Exhibit 9-12 bears the legend MOD IG-62 block diagram, where did you obtain the information to prepare that? to analyze every last one of these.

A. From a handbook which comes along with the Heath Kit.

158 Q. Do I understand correctly, then, that this exhibit does not contain information of any components part from the actual Heath Kit generator? I'm drawing in an attempt to recollect

159 A: It does not. generally whether the things that you Q. You might have specified this, but my notes don't

indicate it; you said Exhibit 9-13 represents a detail of a section of the equipment, do you mean the Heath Kit generator?

A. I do, sir. The reference on 9-17, "ready

Q. Was that information also obtained from the handbook?

A. Yes, sir. is 9-13. What I was doing is the inter-

Q. Referring now to Exhibit 9-17 which are a series of notes by you with instructions to yourself for things to do, do those involve things that you 9-17, intended, to do with respect to the Heath Kit and a generator? and vertical delay multivibrator to

A. I don't recall specifically, but the notes indicate that part of the things I was instructing myself to do were for the purpose of taking scope traces and learning something about the Heath Kit, but I would have to analyze every last one of these sentences in some length and go back and forth between the drawings in an attempt to recollect what I was doing; but I was already reaching into the machine and making changes to use parts of the circuit, that is clear.

Q. Do you recall generally whether the things that you listed for yourself to do on Exhibit 9-17 were to

determine the information that formed a basis for your analysis which you prepared as Exhibits 9-19 and 9-20?

A. Yes, sir. The reference on 9-17, the words "ready for chroma work, IG-62 now connected for Figure A." Figure A is 9-18. What I was doing is the inter-connection of various circuits used in the Heath Kit to eliminate the building of all these garden variety circuits. What the words on page 9-17, Figure A, indicate are that I had interconnected a horizontal and vertical delay multivibrator to horizontal and vertical sync signals derived from the Heath Kit for convenience sake and reinjected the sum of the horizontal and vertical delay multivibrator into the Heath Kit video summer, modulator and RF oscillator circuits to provide a convenient way to come out at Channel 2 or 3 or 4 or 5 so as to be able to go into a TV set with it.

Q. Does Exhibit 9-18 represent what you intended to do?

A. Yes, it does. It shows that I was attempting to vary the color of bars or the background of the

A. TV picture with the circuit shown on 9-18, Figure A. multivibrator.

MR. WELSH: Would you read that

Q. answer, please? [unclear] that has WTV in it?

A. Right.

(Whereupon, the previous
[unclear] Let's break for
lunch at this point. answer was read back
by the reporter.)

(Whereupon, the luncheon
[unclear] was taken.)
Q. You have some numbers in circles with arrows from
them on Exhibit 9-18, do you not?

A. Yes. [unclear] And there are other parts shown

Q. Could you tell us what those - what parts are
indicated by these numbers?

A. I believe you will find those numbers refer back to
the block diagram of the Heath Kit generator and
various points therein, but having just looked at

Q. the block diagram in 9-12, I want to modify that

A. answer. I think those are numbers that I placed

Q. on 9-18 because they represent wires going in and
out of a chassis I built in the Heath Kit and I

A. labeled the number of interconnections. I don't
really recall. [unclear] main oscillator and division [unclear]

Q. Are there shown on Exhibit 9-18 any parts which
were not in the Heath Kit generator? [unclear] frequency

A. Yes, sir, there are. The horizontal delay as
multivibrator. produces vertical bars of expanded.

167 Q. That is a rectangle that has HDMV in it?

171 A. Right. It was part of the Heath Kit generator?

A. That was part of the MR. WELSH: Let's break for
172 Q. lunch at this point. The multivibrator, HDMV intended

(Whereupon, the luncheon
recess was taken.)

168 Q. (By Mr. Welsh) Are there any other parts shown
on Exhibit 9-18 which were not present in the
A. Heath Kit generator?

174 A. Yes, the .01 capacitor and that line labeled
"circle 6" with a caption "to add chroma signal"
near the bottom of the sketch.

169 Q. Any other parts?

A. I don't think so.

170 Q. What about the part with the circle and the No. 3
in it and the arrow?

A. That looks like one of the signals internally
generated by the main oscillator and division chain
that is integral to the IG-62. That puts out the
176 Q. vertical bars. That is about the right frequency

for the checker board pattern. In fact, the words there say: "produces vertical bars if connected," so that is what it is.

171 Q. And that was part of the Heath Kit generator?

A. That was part of the Heath Kit. by moving vertical

172 Q. Now, what was the delay multivibrator, HDMV, intended to do?

A. To display a vertical bar symbol on the screen and move it laterally left to right and right to left..

173 Q. Now, is that the same type of DMV which is shown on Exhibit 9-11?

A. Yes, it is.

174 Q. Referring to Exhibit 9-11, was the DMV depicted there a part of the Heath Kit generator?

A. No, it was not.

175 Q. Is there any other component depicted on 9-11 which was not a part of the Heath Kit generator?

A. No, sir. Well, the sketch in the upper right-hand corner, the pictorial view of the CRT screen and

A. the bar moving across including some shadings of alternating positions for the bar, that probably

176 Q. Was it not possible to get a similar displacement

A. Yes, it does. It was intended to move a dot or a

180 Q. Is that a reference to schematic No. 1 on Exhibit 9-10A?

A. I don't know. It would seem that way since the words are there. Yes, it would. That is what it

186 Q. means. of the two DMV's on Exhibit 9-10A was

181 Q. Is there more than one delay multivibrator shown on Exhibit 9-10A? Yes, it is.

A. Yes, two. It couldn't be. Only one is shown on

182 Q. Did you intend that both of those be connected to the Heath Kit generator in the place indicated by

187 Q. DMV on Exhibit 9-11? Yes, in bars, weren't you?

A. I don't know, but they are shown on 9-10 that way.

183 Q. That is 9-10A?

188 A. 9-10A rather. I could only have connected one DMV to

184 Q. How do those multivibrators differ, if they do?

A. Well, they differ in that one is applied - one is used for horizontal delay and one is used for vertical delay; and, if you look at 9-10A, you will

A. find that the component values are radically different because of the different rates at which they operate and the different delays which are required. I was creating a narrow spot and you would

185 Q. Were they intended to have different functions?

- 185 A. Certainly. One was intended to move a dot or a bar horizontally and one was intended to move it vertically; and, in addition to that, to define the width and height of the symbol on the screen.
- 186 Q. Only one of the two DMV's on Exhibit 9-10A was intended to be used in the rectangle indicated by
- 187 Q. DMV in Exhibit 9-11, was it not?
- A. No, sir, it couldn't be. Only one is shown on 9-11, but that doesn't mean that another one wasn't there.
- 187 Q. You were only interested in bars, weren't you?
- A. Yes, on 9-11, we were only interested in moving a bar.
- 188 Q. So that you would only have connected one DMV to the Heath Kit generator as shown in Exhibit 9-11 at a time?
- A. I would put it the other way around, I would have disconnected the connection to the output to the vertical delay multivibrator so that there would be no limitation on the height of the symbol on the screen which means the bar is there and both elements were creating a narrow spot and you would have to disconnect something to get a full bar.
- 192 Q.

Q. Well, there is nothing in either of these exhibits that shows connection of both the DMV's in 9-10A to the Heath Kit generator as shown in Exhibit 9-11?

A. Not as in 9-11, but 9-10A shows a connection to the Heath Kit generator.

Q. At the same time?

A. Yes, the top delay multivibrator through a differentiating network goes to pin 7 of V9B of the Heath Kit and the vertical delay multivibrator output goes through a thousand puff capacitor to a network at the input of V9A. I think you will find that if you trace the connections of the outputs to V9A to V9B, they are being summed together and that is how you produce the spot.

Yes, that is right. Infact, V9 is the video mixer as shown on 9-12, so that out of V9 comes a sum of the horizontal and vertical delay multivibrator which is a rectangle defined by the widths of the two delay multivibrators.

Q. Now, at the time you prepared Exhibit 9-11, were you not concerned only with bars?

A. On this particular drawing, yes.

Q. And if you contemplated only a bar, then you intended

195 Q. And that would be - was accomplished by varying
the value of potentiometer marked color adjustment?

A. That is correct.

196 Q. Returning to Exhibit 9-11 and 9-10A again, also 9-12, I believe you stated that the DMV's of and
9-10A were being connected to the video mixer
200 V9 of Exhibit 9-12?

A. That is right.

197 Q. Now, is that a summer?

A. V9 is a summer, a video mixer or summer.

198 Q. Now, if you sum or add the signal for the vertical
201 bar and another signal for a horizontal bar to a
summer, do you not get a resulting crossing of
two bars rather than a spot?

202 A. The crossing of the two bars is a spot because
both bars have width or height respectively and
to the effect that they overlap horizontally or
vertically give you a spot.

199 Q. But you also have the bars present also, do you
not?

204 A. Well, the signals are there at the output at the
DMV's, but they are not visible because they haven't
been summed together. That is the function of the

Q. summer, adder, in this case V9. If that is not clear, think of a summer as a gate, as a bias gate which is only excited if sufficient signal comes into it. In this case, sufficient signal means the simultaneous arrival of both the horizontal and vertical delay outputs. ~~setting two bars at right~~

Q. Do you mean the signal for each bar; I mean, that the image for each bar is not visible, but that the resultant image when you crossed the bars is visible? ~~that it takes both signals when they~~

A. That is right. ~~led for an output to be generated from~~

Q. Then you can't see each individual bar?

A. No, not unless you make changes to the circuit

A. biases or something. ~~uses the vacuum tube V9, which~~

Q. Did you have a provision for that in these circuits that we are discussing now, 9-10A and 9-11?

A. I don't remember, I would have to study the

A. schematics to answer that. ~~on a way that at least~~

Q. You did contemplate on 9-11 at least to have a single bar? ~~of two signals to generate a sum output,~~

A. That is right. ~~you how it was done at the~~

Q. Then it must have been visible? ~~to 9-12 and look~~

A. Yes. ~~the rectangular bar near the bottom labeled SP-1,~~

205

Q. And if you connected the other multivibrator, does, you would get a horizontal bar? be very hard to

206

A. No, sir, it would appear that way superficially, but that can't be how it works because it doesn't work that way, that is not the intent. Nowhere do we ever visualize putting two bars at right angles to each other on the screen. As I said, I would have to analyze how that mixer or summer on the Heath Kit works. Well, I will stand by the statement that it takes both signals when they are both applied for an output to be generated from the summer V9, that is its whole purpose.

207

Q. Now, what does the summer include?

A. Well, the summer includes the vacuum tube V9, which is two triodes and some associated resistors and capacitors and diodes.

208

Q. Are they connected to provide ~~And~~-gates?

209

A. Yes, they are biased in such a way that at least for our application so that it takes simultaneous application of two signals to generate a sum output, but I can't tell you how it was done at the time moment. Here it is. If you go to 9-12 and look at the rectangular bar near the bottom labeled S3-C,

210 A. It would seem that way. The Kit generator had a

211 Q. Were the delay, multivibrators of Exhibit 9-10A

A. actually constructed? First objective was to move

A. Yes. It's on the screen. I don't recall just when

212 Q. When was that done? It must have been right

A. I assume early in December of 1966.

213 Q. Who constructed them? As of that work of connecting

A. I did. It's the Heath Kit and attaching it to

214 Q. Did anyone assist you?

A. Yes, initially Bob Solomon did. He is before us.

215 Q. Was this during working hours? Is 9-10A through

A. No, it was late afternoon and evening hours.

216 Q. What did you do with the DMV's after they were

217 Q. constructed? That that Bob Traublay began to

A. Interconnected them to the various elements of

A. the Heath Kit generator and applied the Heath Kit generator oscillator to a small TV set that was sitting around the Canal Street lab. on one of my

217 Q. Did I misunderstand you earlier; I thought you said you purchased a TV set for this? I built the initial

A. We started out, that was when we began to think in

222 Q. terms of color. We started out with a black-and-white set that was hanging around the lab.

218 Q. So even though your Heath Kit generator had a
A. chroma section, you didn't use that at first?

A. Not initially. My first objective was to move
symbols on the screen. I don't recall just when
we got the color set. It must have been right
about that time, too. I had the No. 1 on it.

219 Q. Did you make any record of that work of connecting
the DMV's to the Heath Kit and attaching it to
a television set?

A. Well, the records such as they are are before us.

220 Q. And you are speaking of Exhibits 9-10A through

224 Q. 9-24? you identify Exhibit 24 for the record,

A. That is correct.

221 Q. Was it after that that Bob Tremblay began to pin
assist you? sockets on it. The tubes are missing.

A. Yes, I found that running the effort as an after-
hours private project, I just wasn't getting tubes.

225 Q. anywhere, so I used a technician from one of my
departments. I don't remember where he entered

A. into the picture because I know I built the initial
bread board which we have here. Went 9-30.

222 Q. You have it here?

A. Yes, it is one of the exhibits. In the figure 24.

- 223 Q. Would you select that and bring it here, please?
- A. Yes. the central part near one edge. The edge where the cable enters.
- 227 Q. MR. WELSH: I would like to have the reporter mark this as Exhibit 24. There is already a masking tape affixed to the base plate of this bread board with the No. 11 on it, and perhaps you can mark the exhibit number on that masking tape. 1. If I had to guess, I'd say a part of it was built before and a part afterwards.
- 228 Q. (Whereupon, Exhibit No. 24 Do you have any records that would indicate exactly when that occurred?) was marked for identification.)
- 224 Q. Would you identify Exhibit 24 for the record, please?
- 230 A. Exhibit 24 is a bread board which has four 9 pin vacuum tube sockets on it. The tubes are missing. Three potentiometers and a large number of the resistors and capacitors interconnecting the tubes.
- 225 Q. Are the components on that bread board depicted in any of the exhibits we have been discussing?
- A. I believe that a portion of the components of this bread board are depicted in document 9-10A.
- 226 Q. What portion?
- A. The delay multivibrators shown in the figure gates.

231 Q. correspond to the two sockets which are above and
below the central part near one edge. The edge
where the cable emanates.

227 Q. When was Exhibit 24 constructed?

A. I don't recall that, Mr. Welsh.

228 Q. Was it after the date of Exhibit 9-10A; that is,
December 10, 1966?

A. I don't recall. If I had to guess, I'd say a

232 Q. part of it was built before and a part afterwards.

229 Q. Do you have any records that would indicate exactly
when that occurred?

A. No, sir. What is left of that period of time is

233 Q. what is before us.

230 Q. Now, I believe in connection with Exhibit 9-12,
you indicated that the date December, '66, was added

A. sometime later; is it possible that any of the
dates on the other documents discussed thus far
were added at a date later than the one that

234 Q. appears on the document?

A. It is possible that where there are dates that are

235 Q. not specific to a day, that I might have similarly
annotated a page, but I don't know. Wherever the
dates appear in full, they are the original dates.

231 Q. Referring specifically to Exhibit 16-4A which bears
A. the date of September 6, 1966, is it possible that
that data was added sometime later than September 6,
1966, when you were accumulating documents for
establishing a record of the TV game development?

A. No, I wouldn't do such a thing, especially since
it is countersigned by Bob Solomon on the same
date. It is a receipt because it is a receipt.

232 Q. Now, referring back to Exhibit 24, do you have any
document that shows the complete circuit diagram
of the elements there? It does not seem

A. I don't know at the moment, Mr. Welsh.

233 Q. I don't mean necessarily limited to the ones that
we have been discussing this morning, but, if they
do, that is fine.

234 A. Whatever documents I had are on the table here,
there are no other documents. If there were, they
are long since lost. Are you waiting for me?

235 Q. Yes., were you still involved with TV game development?

A. I am sorry, I lost the train of things.

236 Q. I asked if any of the drawings showed all the

237 Q. circuit elements that are in Exhibit 24? You

A. indicated that portions of the elements on there

are shown in Exhibit 9-10A. ~~at that time.~~

A. Yes, I am trying to wade my way through this bread board, it has been cut up and changed many times.

A. Some portion of this bread board pertains to another figure here you can find on document 9-23, is that?

A. reconstructing it I would guess that this bread board was completed by Tremblay. It also contains a phase shift circuit because it is shown receiving chroma signal from V6 from the Heath Kit. No, I

don't see anything else on here. There are two sockets on here that have parts that do not seem to relate to either one of 9-10A or 9-23. this

236 Q. Well, now, you say that Exhibit 24 has been cut up and changed many times? ~~is that correct?~~

A. Yes. ~~it was built by me.~~ it is the Heath Kit

237 Q. When was the last time it was changed, if you know? ~~he cut it up in the places.~~

A. I don't know that. ~~is that correct?~~

238 Q. Well, were you still involved with TV game development at that time? ~~was there any more?~~

A. Certainly.

239 Q. Do you know who made the various changes?

A. Well, clearly Tremblay at my direction because

there was no one else involved at that time.

240 Q. Do you know whether Exhibit 24 is operative or

A. not? just a matter of weeks until Harrison came on

A. It is very unlikely.

241 Q. Do you recall the last time that it was operated?

A. I don't; I can only go by the documents here.

242 Q. Well, they only indicate circuit diagrams, don't they, without indicating when something was built?

A. No, that is not the practice. A technician
(whereupon, the previous question and answer was
asked by the reporter.)
generally does a clean schematic either before or
after he finishes building something. He doesn't
draw a schematic for any other purpose and this

243 Q. Schematic on 9-23 is in Tremblay's handwriting,
it is a working schematic indicating that he built

A. such a thing and interconnected it to the Heath Kit

244 Q. as shown and went back into the Heath Kit as shown

A. from the output of this thing in two places.

243 Q. Do you know where Mr. Tremblay is today?

A. No, I haven't seen Mr. Tremblay for a long time.

244 Q. He is not employed at Sanders any more?

245 A. I don't know that. Last portions of Exhibit 24

Q. Do you know his whereabouts? Exhibit 9-10A and

A. I don't know. I lost track of him many, many

A. years ago.

246 Q. Was he with this project for very long?

A. No, just a matter of weeks until Harrison came on board.

247 Q. I believe that was in May of 1967?

A. Thereabouts. MR. WELSH: Could I have that last question and answer, please?

(Whereupon, the previous question and answer was

read back by the reporter.)

248 Q. Do you recall approximately how many weeks Mr. Tremblay was on the project?

A. No, I don't.

249 Q. Was it more than two?

A. Probably something of the order of a month.

250 Q. That being the case, his work in connection with Exhibit 24 probably was done in 1967?

A. That is correct.

251 Q. I believe you stated that portions of Exhibit 24

were built before the date of Exhibit 9-10A and

portions were built after?

A. Yes, because I built a piece of it. ^{atics indicative}

Q. What portion? ^{which I}

A. The delay multivibrator portion. ^{these papers.}

Q. Did you do that before or after the December 10th date in 1966 of Exhibit 9-10A?

A. I believe we discussed that already, Mr. Welsh, and I don't remember.

Q. Did you formally apply for funding for the ^{er}, to TV game project? ^{at were left over from}

A. Yes, I did. ^{of my current}

Q. Did you produce any documents that relate to ^{ations} that? ^{already been through.}

A. Yes, I did. The first document is 9-25. ^{was of}

Q. Are there some other documents connected to that document 9-25? ^{and 30, so I suppose}

A. Yes, there are, 9-26 through 37. ^{into this}

MR. WELSH: Off the record.

^{what is that?}

(Discussion off the record.)

Q. Exhibits 9-25 through 9-37 are connected together, did you make the connection? ^{the TV game project}

A. Yes, I guess I did.

Q. What does this group of documents represent?

257
A. They are all sketches, ideas, schematics indicative
of very basic, simple, TV game hardware which I
came up with during the period of these papers.
Late December, January, they all seem to be from
January the 2nd, January the 4th - - - the date

259 Q. What was the purpose of connecting these papers
together?

A. To give you an off- the-top-of-my-head answer, to
collect whatever notes that were left over from
that period that represented some of my current
thinking then. Some of these notes are duplications
again of stuff that we have already been through.
In fact, the original is here of the Xeroxes of
the description of how the color generator in the
IG-62 works. Document 9-32, 33 and 34, so I suppose
it is fair to say that arrangement into this
particular pile isn't altogether too meaningful.

260 Q. Now, referring to Exhibit 9-25, what is that?

A. That is a memo in my handwriting to Herb Campman,
corporate I R & D director. The subject being
a request for funding to put the TV game project
on a formal basis. means 9-30, for example, 9-31,

261 Q. When was the date of that?

others at that time under official I R & D funding task NDB. It all came back to me now, the

265 Q. Referring to Exhibit 9-26, could you tell us what that is - what that depicts? ~~variable spot that is~~

A. The heading on this page is some proposed basic circuits. The first one of which identified as circle 1 basic unit, it appears to be the most elementary TV game I thought of. It consists simply of an extremely inexpensive vertical sync generator, a horizontal sync generator with an output summed together and a video source which is unidentified. And finally a mixer and RF oscillator. Item 2, circle 2 on this page, video add-ons describe one video source which might plug into this spigot, the one called video in at the bottom of that sketch. In this case, it is a pair of delay multivibrators; one for horizontal and one for vertical ^{rate} ~~fed~~ respectively with a sync generator in one up above with the outputs added together there through a couple of diodes and resistors to form a composite video out which is identified as video out (negative going). In fact, the sketch showing the video spigot input on circle 1 at the

bottom of circle 1 shows a negative going video wave form. It all comes back to me now, the sum of 1 and 2 is the most elementary circuit imaginable for creating a movable spot that is synchronized to a raster scan. It is movable vertically and horizontally across the screen as indicated by the delay periods in the DMV blocks under circle 2.

MR. WELSH: Could I have that answer back, please?

(Whereupon, the previous

answer was read back

by the reporter.)

Q. Do you consider that to be an accurate statement of your intention in TV games?

A. I consider that to be my best interpretation that I can make of a nine-year-old piece of paper.

Q. Had that been done before, to your knowledge?

MR. WILLIAMS: I object to the question, had what been done before?

MR. WELSH: What he conceived as stated on this document 9-26.

Q. THE WITNESS: I still don't, et, understand the question, by whom? an reconstruct,

Q. By anyone, were you the first to do that? cepts and

A. Certainly, these are my ideas. a very low cost

Q. Does this document 9-26 have any relation to the other documents that we were discussing earlier, 9-10A through 9-23? an elementary circuit for

A. Yes, it has. It must have since it precedes them in time - or does it? able vertically and

Q. No. isentally, an accurate statement of what you

A. No, it doesn't, I am sorry. I am sorry, in digressing

A. again, but we seem to have a problem, the periods

Q. overlap, 9-10 and 9-11 are earlier. Would you ask?

A. the question again? You asked what the relationships between 9-10A -- generator circuit with provisions

Q. Just make it 9-10A and 9-11. re, the phase of the

A. And 9-26? oscillator with respect to reference phase,

Q. Yes. also providing for both solid color backgrounds

A. Well, to the best of my recollection, 9-26 the represents the first attempt on paper to convert some of the ideas in the earlier papers to a of really low cost device. I say that because right from the beginning we invariably talked about a

A. \$19.95 TV game and that millennium hasn't come yet, so the notes in 9-26, as best I can reconstruct, were my first attempts to get down to concepts and circuit designs which result in very low cost hardware. Let those depict?

Q. Is the statement that you made earlier, that is creating - providing an elementary circuit for creating a movable spot that is synchronized to a raster scan and is movable vertically and horizontally, an accurate statement of what you were seeking as an objective?

A. Yes, sir, it is.

Q. Could you tell us what is depicted on Exhibit 9-27?

A. 9-27 is a combination block and schematic diagram showing a chroma generator circuit with provisions for adjusting the color phase, the phase of the chroma oscillator with respect to reference phase, and also providing for both solid color backgrounds on the TV screen and color strips through the intervention of another delay multivibrator for horizontal and-gating that with the output of the chroma oscillator.

Q. Did you prepare this document?

A. Yes, it is my handwriting.

Q. Do you know when you prepared it?

A. No, sir, I don't.

Q. Referring to Exhibits 9-30 and 9-31, would you tell us what those depict?

A. 9-30 again is the order of a list of things to be done, and judging from the check-off marks¹ in ink and the words, they were indeed done. What it describes is a potentiometer mounted such that its shaft - let's see now. Let me rephrase that.

It simply describes some sheet metal bracketing for mounting a potentiometer. No, a trimmer

capacitor, not a potentiometer, and a switch. That trimmer capacitor is listed as C24 and I believe was used to pull the chroma oscillator for the purpose of changing its frequency. If we look

at the last item on that page, Item 5, it shows a trimmer capacitor connected to a spinner. The

words are "spin with a finger" which indicates I

had some intention of generating a game by spinning

a spinner which in turn rotated a trimmer capacitor

which again in turn either pulled the frequency

or phase of a chroma oscillator to get color changes

on the screen. It also says NG at the bottom of the page, which means it didn't work in this fashion.

278 Q. Was that contemplating the background color of the screen?

A. I can't tell you for certain because of the timing whether that was background color or background color plus a bar or if vertical background color was one of the intentions.

279 Q. I believe the question was with respect to both Exhibits 9-30 and 9-31, they appear to be two pages of a single document.

A. Right. Page 9-31 shows a horizontal and vertical delay multivibrator and indicates that they are to be connected to the video mixer in the IG-62 Heath Kit and shows that if that were done, and with all other video circuits disconnected in the IG-62, what will result is a variable position vertical and horizontal line which can be made to cross over at various points of the screen.

280 Q. Is that similar to what we discussed earlier?

A. Well, as a matter of fact, it is opposite of what we discussed earlier. It is something I hadn't

- remembered doing. As the little insert shows in the center of page 9-31, what I evidently contemplated was running an index mark, cross pointers over - with it looks like an overlay with numerics on it to indicate numbers on the screen. The words, delay pots may be spun, underneath indicated that if we took the delay controls on the delay multivibrators and put a spinner on them, if they were 360 degrees continuous potentiometers and ^{we} spun them, we would get a variable of two lines on the screen, one horizontal and one vertical, and the points of interchange would be arbitrary and the point where it stopped might be identified by a number on that overlay that is sketched in here and that is a way of playing roulette. You come to a number by spinning two potentiometers.
- Q. I believe you stated that you didn't recall what the TV TY meant?
- A. I still don't, no.
- Q. And what does the remainder of Exhibit 9-31 relate to?
- A. Additional ideas on how to color code the displayed bar symbols. Crosses under TV TY No. 3 and some

Q. additional ideas under TV TY No. 4 suggests that
 A. in place of spinning potentiometers, we use a random noise generator; for example, photo cells with
 Q. discs spinning in front of the photo cells. Does
 A. that answer your question? as bright spot that

Q. Yes, I believe so. Under the section TV TY No. 3

Q. at the bottom is the note that says, "Cross may light
 become a bright spot with proper video." and

A. Pulse amplitude or some level clipping ahead of

A. RF modulator. - the answer is yes. Every TV game

Q. Doesn't that contemplate that the spot is simply
 the intersection of the two bars which would provide
 more intensity than the remainder of either bar? yes

A. No, it does not. The words clearly indicate that

Q. it becomes a bright spot with the remainder of the
 cross not showing and that that is to be done by

A. having adequate relative pulse amplitude so ^{as} to _^

Q. press the rest of the crossbar into black level

or by clipping which eliminates the low amplitude

A. altogether and makes only the crossover visible.

Q. It is just another set of words to describe an

A. Anding function of horizontal vertical delay

Q. multivibrators. ~~any other~~ ~~with~~ ~~is~~ ~~the~~

Q. Did you ever attempt to achieve this effect?

A. Well, certainly, we do it in all our games. You mean the specific method of clipping and limiting?

Q. Yes.

A. You mean the two bars or the bright spot that results?

Q. Generating a cross with two bars producing a bright spot in the manner described after the word

note in the section TV TY in Exhibit 9-31.

A. Every TV game - the answer is yes. Every TV game

produces, uses delay multivibrators, so in effect produces complete intersecting horizontal and

vertical bars of which only the intersection shows up. They all do.

Q. And have you achieved that, the effect, with what you referred to here as proper video pulse amplitude?

A. Yes.

Q. And have you also done it with some level clipping ahead of the RF modulator?

A. Yes, sir.

Q. Is that done in every instance?

A. Well, they are really all the same thing.

Q. So I understand correctly, spot generation is the

result of generating bars which at their intersection have greater intensities than the remainder of the bars on the screen?

A. You can choose to think of it that way, but in a display it is the symbol, the signal that does the unblanking and results in the video signal on the screen that counts and not all the other things that go into making up that signal.

Q. But prior to the unblanking, there is no unblanking so there is no bar? , you mean blanking circuits?

A. Well, I won't be argumentative, yes. I just don't know the significance of what you are after.

Q. I am just trying to find out whether this process which you describe here is the same as one where you obtained the spot by selective unblanking of the electron beam?

A. That is how you always obtain a spot in a cathode ray tube, by selective unblanking.

Q. Then you did not intend here in this description in Section 3 of Exhibit 9-31 that there be a generation of bar images?

A. Yes, we did. Under TV TY 3 we talked about both. In the beginning of the section we specifically

talk about complete bars which can be crossed over and maybe a color selectable color change and then in that small note at the bottom of that paragraph, we talk about the opposite situation in which the cross is sent through level clipping or semi-circuits or anding circuits so that only the cross of a super position of the tube bars that you imagine become visible on the screen and form now what we call a spot or a symbol.

Q. So by level clipping, you mean Anding circuits?

A. Yes, it is really the same thing. If you look for a logical answer, it is really the same thing.

Q. You also consider that proper video pulse amplitude as used here achieves an Anding effect?

A. Yes, these were vacuum tube designs and my guess

is what I was thinking of is biasing of a video

stage such that it takes the sum of vertical and horizontal delay multivibrators to overcome the

bias and produce a separate output pulse, the customary way to make an and gate in the vacuum

Q. tube days. (I asked you to look at Exhibit 9-36 and tell us what that is?

A. 9-36 appears to represent my attempt to refresh

my memory on just how cathode coupled multivibrators operate. Sort of a ~~self~~² pictorial. counter, random

Q. This document was prepared by you? and I think

A. Yes, it was. This later as a noise source or a

Q. Do you know when it was prepared? circuit, but I

A. No, sir. Well, but I know it was used somewhere and

Q. It does not bear a date, does it? then.

A. It does not. Documents 9-37 through 9-37 clipped

Q. Do you have any idea when it was prepared in relation to these other documents? section with

A. The fact that it is in here with these documents

A. means that it must have been collected with it.

Q. Besides that, it is a topical subject and it pertains

A. to the delay multivibrators that we have been

Q. looking at before, so it is consistent. sent?

Q. Could you tell us what Exhibit 9-37 is?

A. 9-37 is a verbal description of a circuit that was

A. built sometime later which purports to play a

game by having a neo bulb ring counter provide what

amounts to a random number generator and in combination with quoted cards. None of this has anything to

A. do whatever with TV games.

Q. How did it happen to be selected for inclusion in

these documents?

A. Because, as I recall, the neⁿring counters, random number generator, was used later on and I think appears sometime later as a noise source or a random source for triggering some circuit, but I don't recall; but I know it is used somewhere and we will probably come across it later.

302 Q. Were these documents 9-25 through 9-37 clipped together during one of the cleanup periods when you were preparing documents in connection with the TV game history?

A. Yes.

303 Q. Do you recall which cleanup period?

A. No, sir.

304 Q. Exhibit 9-37, did you prepare that document?

A. No, I don't know who did that.

305 Q. Do you recognize the handwriting at the bottom?

A. No, I do not. It is not mine nor that of any of the technicians or engineers.

306 Q. Did you select Exhibit 9-37 for inclusion with the other documents?

A. Yes, I did.

307 Q. Where did you find it?

A. It was in a collection. I am quite sure the reason why it is there is because I never finished reading it and the first words random number generator triggered the recollection of the piece of gear that we built with a random counter generator on it and I stuck it in the pile and I thought it was connected; where if you read it literally, there is no connection.

Q. Do you recall where you obtained the document?

A. One of the engineers in my division, I don't know who anymore.

Q. One who worked on the project?

A. No, sir, somebody else.

Q. Referring now to Exhibits 9-38 through 9-42, do they constitute a group which are stapled together?

A. Yes, sir.

Q. And did you assemble these papers in that group?

A. I would assume so.

Q. Was this again done in connection with the collection by you of papers relating to TV games in one of the periods when you accumulated such papers?

A. Yes, sir. There is no real reason why this isn't attached to any of the others.

13 Q. You say there is no real reason why it wasn't?

A. There isn't. It might have been for all I know
14 and it may have become detached.

Q. Do you recall when you assembled these papers
together?

A. No, not exactly. I recall was the first person

15 Q. Starting with Exhibit 9-38, would you tell us what
that is, please?

A. 9-38 is a series of notes I made subsequent to a
discussion with R. Solomon entitled further planning,
TV gaming, in which I first reiterate the status
quo and then project to future activities.

16 Q. What is the date of that document?

A. 11 February, '67.

17 Q. Did you prepare that document?

A. Yes, I did.

18 Q. Does it have other pages than Exhibit 9-38?

19 A. It has three pages and the pages are marked page 1
of 3 and page 2 of 3 and page 3 of 3 respectively.

20 Q. Those are exhibits - - -

A. 9-38, 9-39 and 9-40.

21 Q. They together constitute a single document?

A. They do, sir.

321 Q. Were all of those pages, 9-38, 9-39 and 9-40 all
 Q. prepared by you? participate in this discussion?

A. Yes, sir. likely.

322 Q. What was the occasion of your having the discussion
 with Mr. Solomon? a record and in the event persons

A. Mr. Solomon if you will recall was the first person
 I communicated the whole idea of TV gaming to and he
 he is also the person I had countersign the to
 initial disclosures. He is also a person I was
 hoping that would give me a hand after hours putting
 the gear together. The fact remains that I did
 most of the work myself and on occasion tried to
 reinterest him and get him involved again. As I
 recall, this is one such attempt. I had to talk
 to somebody and I talked to him since he was
 initially involved and nobody else was on board yet
 except maybe the technician. for generating color

323 Q. Was Mr. Solomon ever assigned to the project?

A. No, not officially, never. nonstandard signals.

324 Q. The one document of Mr. Tremblay's, which is
 Exhibit 9-23, I believe is dated 2-6-67. is

A. 2-6-67. In a discussion between P. Solomon

325 Q. Which is prior to this time? to proceed as follows

A. Right.

Q. Did Mr. Tremblay participate in this discussion?

A. Very unlikely.

Q. I would like to ask you to read this document so that it is clear in the record and in the event persons attempting later might find parts of it illegible.

I know our copy is and I have had some trouble with some of the words, so I would like to ask you to read it into the record.

A. Discussion with R. Solomon. Future planning TV gaming. Status quo is the first subject heading. A Heath Kit IG-62 generator has been modified during December, '66; Jan. and Feb., '67, by add-on hardware to allow generation of a vertical bar movable across the TV CRT face and adjustable in color. The object of this work was to familiarize R. Solomon and R. H. Baer with techniques for generating color changes at will and to check the response of a typical TV (color) set to nonstandard signals. This work was completed on Feb. 11, 1967.

The next subject heading is next phase. In a discussion between R. Solomon and R. H. Baer, it was decided to proceed as follows:

One. Build a transistorized bread board assembly consisting of a 15,750 CPS free-running horizontal sync oscillator (multivibrator) a 60-cycle line frequency pulse generator for vertical sync. A mono stable (one shot) multivibrator plus flipflop sync to vertical sync (60 cycles) and a color chroma phase shift keying circuit based on the work done with the Heath Kit generator. This bread board would feed composite sync and video into the Heath Kit modulator set to channel 3. Objective is to provide a split field display with black or white or two colors alternating as shown. Video unblanked wave form as shown will be colored by a potentiometer or a photo (resistive) cell whose exposure to light will be controlled by a mask. The next to the last paragraph is a pictorial showing a TV screen and wave forms which correspond to the video unblanking shown on that little sketch. Continuing on page 2, it is the basic principle of a variable mask which will be exploited to provide an assortment of games using only the electronics described above. For example, a mechanical arrangement to allow a pumping

action to gradually expose the photo cell to increasing amounts of light could raise the water level in a bucket represented by a transparent CRT overlay. Blowing into a box with two straws from opposite directions to actuate fan blades to control the mask is an alternate approach. In any event, a black box having a shaft connected to the photo cell mask and all above electronics is visualized. Only ingenuity and mechanical attachments are necessary to convert this bread board hardware into many operable games. That is the end of page 2. Page 3 shows a schematic, it is entitled typical block diagram of projected bread board hardware and it shows an elementary way of deriving vertical or horizontal sync and a single delay multivibrator for selective unblanking part of the screen as a function of an external control with a dotted box shown for potential add-ons of chroma phase shift and getting circuits to create color.

Q. Was the next phase as set forth in Exhibits 9-38, 39 and 40 pursued?

A. I am not certain. I think we will have to wait until

we see further documents. I don't know whether we ever built as rudimentary a box as this. We are going to have to wait until my memory is refreshed by subsequent documents; I don't remember effectively

329 Q. Now, this document does not refer to spot generation or moving of spots, does it? forms by rotating

A. No, it does not. light source and that photo sensor.

330 Q. As of the time of this document, had you at least temporarily decided to pursue a course of that could developing a game like this one here versus one rotor with movable dots? effect is a substitute for

A. I don't remember; I can only guess. rotor

331 Q. What would you guess?

A. That this was an attempt to get something extremely cheap and simple out, which indeed it is.

332 Q. Was the pursuit of a game with dot generation discarded at least temporarily at this time?

A. I don't recall the exact sequence of events.

333 Q. What is Exhibit 9-41? bears on the bottom right-hand

A. 9-41 is a pictorial sketch which shows a small box containing a disk of the type that the words in the previous pages refer to that can be spun or rotated from a control shaft sticking out of

the box in the center with provisions for moving a photo cell identified as PC over that disk and a light source indicated by the bulb symbol on the opposite side of the disk, so the disk is effectively an aperture disk and is identified as an aperture disk capable of creating wave forms by rotating it between the light source and that photo sensor.

The purpose of the whole arrangement being to provide voltages or variable resistances that could be used to control the delay of a delay multivibrator. The whole thing in effect is a substitute for a manually operable delayed multivibrator potentiometer.

Q. And was Exhibit 9-41 prepared by you?

A. Yes, it was.

Q. When was it prepared by you?

A. February 12, '67.

Q. That is the date it bears?

A. That is the date it bears on the bottom right-hand side, sir.

Q. What is Exhibit 9-42?

A. A list of possible games based on simple electronics, that is the heading. Described on February 11,

page 1, 2 and 3 only; that refers to the three-part document we just read into the record before . It shows four different proposed games or game did you functions. They are illustrated with small sketches colored in with colored pencil. Most of which-tically we wound up building later on.

38 Q. Do these games have a common characteristic?

A. Yes, they do, they have the common characteristic of utilizing a delay multivibrator to move the line of demarkation between either a dark portion or a light portion of the screen or one color and another color up and down vertically on the screen.

39 Q. Could that accurately be described as a horizontally split field?

A. Yes, it could be described as a horizontally split field. It is a vertically split field. Horizontal bars make it vertically, don't they?

40 Q. I believe the horizontal split field is used in the second one from the line from the top of that exhibit.

A. We have a semantics problem, but it was intended as an unblanking of any number of raster lines down to a certain number of lines or a color and then a

different color beyond that to the bottom of the screen.

Q. You used the term horizontally split field, did you not?

A. Yes; in retrospect looking at it, that is a vertically split field. It is split into horizontal bars.

Q. You did prepare Exhibit 9-42, did you not?

A. Yes, I did.

Q. When did you prepare that exhibit?

A. 12 February, '67.

Q. Is that the date it bears?

A. Yes.

Q. Was this document, Exhibits 9-38 through 9-42 copied into Exhibit No. 16?

A. Yes, it was.

Q. And by whom was that copied?

A. The first two pages, pages numbered 5 and 6 in Exhibit 16 are done in Bill Harrison's handwriting with my counter signature at the bottom of the page. Page 7 is in my handwriting, I assume that it was quicker for me to copy my own drawing than have Bill Harrison do it, so I did it for him. Those three pages are copies of 9-38, 9-40 and 41;

and finally 9-42 - - -

Q. Exhibit 9-42 was copied as page 8 of Exhibit 16, was it not?

A. That is correct, sir, with the colors omitted.

Q. When were Exhibits 9-38 through 9-42 copied into Exhibit 16?

A. I don't know that. The company is required to keep

Q. I believe you testified earlier that the material on pages 1 through 4 of Exhibit 16 were placed there in May of 1967?

A. We can only say that by inference, Mr. Welsh, because on the 4th of May the first entry by Harrison appears where he is beginning to do lab work and all this other material up front in the book consists of copies of my notes which he made in an effort to render them readable for himself, because he can't read my handwriting, during the process of acquainting himself with the job because he came on the job cold early in May or late in April, whenever it was. So those dates on these entries, just when he made those entries, I don't know. I said they were done early in May because they preceded the 5-6-67 date which represents his

first lab note entry.

Q. Do you know why blank spaces were left on pages 10 through 19 of Exhibit 16? If, please?

A. No, I don't know. Page 9 through page 21, R. H. Baer.

Q. Was Mr. Harrison instructed to prepare this September, notebook, Exhibit 16? If, '67. No work was done

A. Every technician in the company is required to keep a lab notebook on a daily basis. No work on TVG in

Q. Do you have any reason to believe that these entries on pages 1 through 8 were not put into this book at a date even later than May 4, 1967?

A. No, it is extremely unlikely because the material is clearly copied out by Bill Harrison to acquaint himself with the job, that is the way he works.

A. For that matter, my guess would be that the gap is there because he thought he probably would get more stuff out of my file that he would want to copy in in sequence and he wanted to leave that room free so he kept that room free and began his notes at some place later.

Q. Why would he want to keep that room free? If, please.

A. I am only guessing, but I handed him some stuff and he probably anticipated more stuff from me,

which never arrived.

Q. Would you refer to page 9 of Exhibit 16 and read the entry there in its entirety, please?

A. No entries from page 9 through page 21, R. H. Baer. Note pages 1 through 8 cover period from 1 September, '66, through 12 February, '67. No work was done between 12 February, '67, and May 1, '67, when William Harrison (12-23-40) began work on TVG in special room, sixth floor, SAN, which is Sanders Nashua, and then Canal Street; and at the bottom is my signature, R. H. Baer.

Q. When did you make that entry?

A. I don't know because there is a date 12 February, '67, which is crossed out; I don't know when that was made.

Q. Well, if the entries on page 1 through 8 were made prior to the entries after page 20 and there was no work between the dates of the entries on those pages, then what is the reason that those pages were left empty?

A. I thought I just went through that, Mr. Welsh.

Q. You said because you thought there might be other notes?

A. No, I did not say that; I said because Bill Harrison probably assumed that having handed him six or seven pages which he decided to copy out because ~~oth~~ he couldn't read my handwriting, he may have thought he might be getting some more stuff from me so he left some room in the book before starting his lab notes so there would be no conflict. of paper

Q. Do you know whether he actually thought that?

A. No, I am only guessing. sense of blank pages in this

Q. If he were the one who selected the pages to be left blank, why did you make the note, the entry on page 9?

A. That was done years later. I think in organizing

the material, somewhere I finally must have come

across - I must have put together from all the

papers we have here the date when Harrison first

came on board, it says so clearly here. So I have simply made the note here that no activity - there was a hiatus there and in order not to lose the recollection, the determination I made whenever that was made, that there was no work done between

12 February and May 1, I put it in here.

0. You made the determination to explain the absence of

- information on pages 9 through - - - many years?
- A. No, not really, just to lend continuity to the picture because we have a gap here of material both in this book and in here and somewhere along the line I finally put the dates together of when the work really stopped and when it recommenced.
- Q. I could have put this on any other piece of paper and I chose to put it on this page.
- Q. Did you discuss the presence of blank pages in this book with anyone at the time that you made this entry on page 9?
- A. It ^{was} ~~is~~ obviously of no significance to us.
- Q. Have you discussed it with anyone since that time?
- A. No, I haven't. It has never come up.
- Q. I believe you stated that the entry on page 9 was made years later?
- A. Yes. Also the entry on page 20, all this business of crossing out pages and marking page 20, for example, are all part of my housekeeping efforts somewhere downstream.
- Q. What is the entry on page 20?
- A. The entry on page 20 says end of blank section page 9 through 20.
- Q. You stated the entry on page 9 was made several

years after the May, 1967, date; how many years?

A. I don't know exactly. of the crossed-out portion

Q. Was it after these lawsuits were filed?

A. I don't remember. Somewhere along the line when I attempted to organize the papers, it is pretty obvious. on that date when the words describe

Q. Did you attempt to organize the papers in connection with the pendency of litigation?

A. I do not recall whether those entries were made you, for this purpose or years before when I organized the paper work simply to make order. indicates

Q. Did you place on page 9 the date which has been

A. crossed out? because 12 February, '67, was the

A. Yes. of the period during which the initial entry

Q. That date is 12 February, 1967? the initial entry.

A. Yes. It just got here and it was crossed out

Q. Did you originally put that there to indicate that you made that entry on 12 February, '67? whatever

A. No, I don't know how that got there or what that means.

Q. Might you have intended to indicate that and then changed your mind and crossed it out?

A. No, it is clearly inked out with the same ink,

purple, so it was inked out right away.

Q. Would you say the ink of the crossed-out portion is. . . .

A. Yes, it is the same as the rest of the page. . . How

A. can I put the date 12 February, '67, on a piece

Q. of paper on that date when the words describe

A. activities that take place months later; clairvoyant

Q. I am not. to Exhibit 9-40, that has been copied

Q. Well, I would like to put that same question to you,

Why would you put the date 12 February, '67, on

A. there when the other entry on page 8 indicates

Q. activity at a later date? Is there any difference

A. Right. . . Simply because 12 February, '67, was the

A. end of the period during which the initial entry

Q. relating to the paper work of the initial entry

was. It just got here and it was crossed out

immediately. What should be on this page, if

A. any date, is whatever date that was or whatever

year that was that I made that date and that isn't

Q. here. . . .

Q. Have you discussed this notebook with anyone since

A. the lawsuits were filed? . . .

A. No, sir, I have not. . . .

- Q. Have you discussed page 9 of the notebook with anyone since these lawsuits were filed?
- A. No, sir.
- Q. Has anyone discussed the notebook with you?
- A. No.
- Q. Or page 9?
- A. No.
- Q. Referring to Exhibit 9-40, that has been copied or the circuit diagram there has been copied onto page 6 of Exhibit 16, has it not?
- A. Yes, it has.
- Q. Are there differences or is there any difference between the two drawings of that circuit diagram?
- A. Not as far as I can tell.
- Q. I direct your attention to the uppermost rectifier in the left portion of the two diagrams, did you put it in backwards?
- A. I put it in backwards, the technician who copied it out put it in right.
- Q. When you say I put it in backwards, did you mean on Exhibit 9-40?
- A. Yes; if you look at the polarity on that schematic where it says plus ten volts there, you find that

is backwards and the technician ^{dutifully} beautifully corrected it in copying it out and reversed it and corrected the error. *

Q. ... motivated you to accumulate the materials

Q. That was Mr. Harrison?

A. Yes., certainly the first several times simply

MR. WELSH: I am going to be referring to documents in Exhibit 23 which I believe was the file of Mr. Harrison's material and I would like the reporter to mark these pages successively in the manner similar to those in Exhibit 9 starting with 9-1 and marking each page in turn.

(Whereupon, Exhibits 23-1 through 23-231 were marked for identification.)

Q. Mr. Baer, I know we have had some questioning about accumulation of materials here and there may be some overlap on a few questions that I am about to ask. On how many different occasions did you attempt to accumulate the material which has been produced here to show the development of the TV games?

A. I don't recall exactly, probably two or three times

- probably on the occasions of my various moves from one location to another. Q. And to your file or Harrison's?
- Q. And what motivated you to accumulate the materials on each occasion? A. The scene into other jobs. There
- A. Well, certainly the first several times simply the desire to create order because most of the material was generated by at least three of us. Q. That is, myself, Harrison and Rusch; and at various times if for no other reason but for interest's sake I organized the materials to above all find things because, after all, as late as 1971 and '72 we needed to refer to this material in detail in negotiations with Magnavox, so through the years it has been pertinent to look at it off and on for one reason or another and every time you tend to organize it some more because it is difficult to find things in this various large collection of newspapers. Q. Did you retain custody during that time?
- A. The material was in various places, in Harrison's file cabinets and in mine and while Rusch was on the job, of course, he had physical possession of his notebooks which after that were in my file
- ★

A. on Harrison's file. past year.

Q. Why were they transferred to your file or Harrison's?

A. Because we continued to work on TV games and he

Q. disappeared from the scene into other jobs. There was no reason why he should keep the books since

A. he was no longer associated with the job.

Q. You say that there were several occasions, can you

A. be more specific as to how many occasions there were?

In general they asked me to gather as much of

A. No, I can't, Mr. Welsh. well as models that survived

Q. Do you recall the first occasion? to mean that they

A. No, I do not. have them handed in in some orderly

Q. On that occasion, were you asked by anyone else

Q. to accumulate or organize the material relating

A. to this development? was done then.

A. No, sir. of the numbering done at another time?

Q. Were you at any time subsequent to that first occasion asked to organize or accumulate the material?

A. Yes, sir. one other time, but the circled numbers

Q. How many times did that occur? during the materials

A. To the best of my recollection, only once within the past year. the materials together.

Q. That was within the past year? plus on some of the

- A. That was within the past year.
- Q. Who asked you to do that? Those on. Whether that
- A. Lou Ettlinger and Mr. Seligman. Before, I don't
- Q. Did you discuss the accumulation of the material
- Q. with either of them prior to that time? Request in the
- A. No, sir. From Mr. Ettlinger had you attempted to
- Q. What did they ask you specifically?
- A. I can't tell you what they asked me specifically,
but in general they asked me to gather as much of
the written material as well as models that survived
Q. through the years and I took that to mean that they
would like to have them handed in in some orderly
A. fashion and I proceeded to organize the stuff. at
- Q. Was that when you numbered the files? didn't matter
- A. Some of the numbering was done then. here or
- Q. Was other of the numbering done at another time?
- A. I would imagine that there were so many markings
on many of the envelopes that I must have marked
A. them at some other time, but the circled numbers
on the manilla envelopes segregating the materials
was done at a more recent time in response to
getting all of the materials together.
- Q. How about the numbers in rectangles on some of the

documents in Exhibit 9? effort to collect

A. I don't recall when I put those on. Whether that was the last time around or once before, I don't know. I think I already said that once or twice I

Q. And about how many times before that request in the last year from Mr. Etlinger had you attempted to organize this material? I tried search here more

A. Not for quite a while prior to that. There was no reason to. Years, I guess, maybe; I can't really tell. the material

Q. If there were no reason to, then why did you do it at all? In, cleaning up our files on occasions of

A. Well, my guess is that at a time when we did not specifically need to refer to it, it didn't matter too much whether or not it was all there or

Q. consistently organized, and accumulating and

Q. But you did make efforts to accumulate it at that

A. time? the material was accumulated in the process.

A. We were careful through the years to make sure nothing got lost. From that sense, yes, we were careful to accumulate all the material through the

Q. years. They were individually kept, Harrison and

A. myself. I recall the last time we made the

Q. Did you make any specific effort to collect your materials prior to the time that Mr. Ettlinger and Mr. Seligman requested them from you?

A. Yes, I think I already said that once or twice I organized and tried to accumulate the stuff. As it turned out subsequently, I never got all of it until we made a concerted search here more recently.

Q. What reasons did you have on those earlier occasions to accumulate the material?

A. I think the same reason I gave you before, any Mr. Welsh, cleaning up our files on occasions of moving or possibly ^{the} ~~to~~ ^{to} urge the cleanup after we couldn't find something that I might have had to refer to.

Q. How much time did you spend accumulating and organizing these materials?

A. Well, the material was accumulated in the process of generating it over a period of a couple of years. If you mean by how much time, how much time I actually spent in trying to search for files - - -

Q. Yes.

A. I can only recollect the last time we made the search

- in order to get the materials together which you have before you here, and, that consumed the better part of a couple of weeks or so. Not so much the searching, but the collating. a company policy and
- Q. Up to that time, had you kept the material on any organized basis?
- A. Yes, I ^{had} ~~have~~ it in folders and Harrison had material in folders, but we never interleaved [✓] the two or checked for duplications which I attempted to do this last time around.
- Q. Did you make any lists of the materials at any time?
- A. Not until more recently.
- Q. No, I did not.
- Q. Now, you stated that each time you moved, you probably made some attempt to organize the material, is that accurate?
- A. That is what I said, yes.
- Q. About how many moves did you make?
- A. Quite a number, a half dozen, at least.
- Q. From one physical location in the company to another?
- A. That is right.
- Q. Did you ever discuss the keeping of records

generally with anyone from the patent department?

A. Of these specific records, you mean?

Q. I intended the question to be general first.

A. Well, in that regard, there is company policy and general instruction that is conveyed to every the employee with respect to keeping notebooks; so in

A. that sense, there was discussion between the patent department and myself with respect to keeping notes.

Q. Was there any specific discussion with respect to keeping records of the TV game development?

A. No, not until more recently.

Q. There was no discussion earlier in the development while the development was continuing and going on?

A. Well, certainly there was discussion constantly because we interacted to get the patents underway and obviously some of the material which we have either gone through or are about to go through, was used in those days to help bring people in the patent department upstream as to what it is all about.

Q. But was there any specific discussion as to the

Q. keeping of the records of the development?

A. I can recall ~~of~~ no such discussion.

Q. Was there ever any discussion regarding any ~~making~~ insufficiency in the records that had been or were being kept with respect to the development of the TV games?

A. No, sir, at least none that I can recall.

Q. I believe I asked this before, but was the request from Mr. Etlinger or Mr. Seligman a recent request within the last year in writing?

A. It was not, it was verbal.

Q. I believe you stated Mr. Harrison started to work on the TV game project in May of 1967?

A. Yes.

Q. Were you acquainted with Mr. Harrison prior to that time?

A. I don't really remember. Since he worked in one of my departments, I probably knew of him, but that was the first time that I worked with him. And then I didn't know too many technicians because it is not normal for division managers to do bench work.

Q. He was simply a technician?

A. At the time.

- Q. I ask you now to refer to Exhibit 9-43 and ask if you would tell us what that is, please?
- A. That is a sketch of a layout preparatory to making a small board and mounting parts on it for a circuit which is called gun electronics and further identified in the bottom as odd-even TV game; and I am surprised at the date.
- Q. By particular instructions?
- Q. Who prepared that?
- A. Bill Harrison.
- Q. How do you know that?
- A. Because his signature is at the top and I recognize his handwriting.
- Q. What is the date of the document?
- A. 2-19-67.
- Q. Did you say you were surprised at the date?
- A. Yes.
- Q. Do you recall the document?
- A. Certainly I recall it, what it represents.
- Q. Why were you surprised at the date?
- A. Because February 19, '67, is clearly earlier than May which we had assumed was the starting date for Bill Harrison on the job.
- Q. You say you assumed that was the starting date?

- A. Yes. He worked in the lab quite often.
- Q. And what was the basis of that assumption?
- A. The fact that his lab note entries in Exhibit 16 begin on May 4, I believe.
- Q. That is on page 21?
- A. Yes, May 4, '67.
- Q. Did you give Mr. Harrison any particular instructions with respect to making entries in Exhibit 16 when he began to work on the TV game project?
- A. No, as I said earlier, keeping a notebook is a requirement and he simply entered data as he saw fit for the job. We don't lay down requirements as to specifically what a man has to put down.
- Q. Did you give him any instructions with respect to a notebook at the time he started working on the TV game project?
- A. No, sir, at least I cannot recall doing that.
- Q. Did you give him any instructions with respect to keeping a notebook after he started up the TV game project?
- A. As I said, Mr. Welsh, it is a matter of standard operating procedure to keep a notebook and he kept a notebook and it was obviously visible to me

because we shared the lab quite often.

Q. What is each man that keeps a notebook supposed to put into the notebook?

A. Data which may be of future value, measurements, schematics, wave forms that he might have measured. Anything required to be able to trace back your steps when you are working on a continuing development so that you don't have to redo on Monday what you did on Friday.

Q. With respect to his work on the TV games, was Mr. Harrison supposed to put down all information that he obtained in his work on the games in this notebook?

A. Why, certainly, and as a matter of fact he did.

Q. How do you know that he did?

A. We have several hundred pages of notes here that show that he made more than the usual detailed notes.

Q. But he did not enter all of those notes in the notebook, did he?

A. No, he chose to do a lot of his note-taking on looseleaf paper, which is all right with me as long as people keep it together.

- Q. Well, is that in accordance with the standard procedure that he keep some of his notes on looseleaf paper and other parts of his notes in the notebook?
- A. No, it was not.
- Q. Did you know that he was not entering all of his notes into the notebook?
- A. Certainly I knew.
- Q. Did you discuss his failure to follow the procedure with him in that regard?
- A. No, sir.
- Q. Did it concern you in any way?
- A. No, it did not.
- Q. Why did it not?
- A. For two reasons, the notes he was taking were orderly and useful, and secondly the work did not entail any government work and there was no requirement on us from a contractual point of view to worry about the shape in which we created our format.
- Q. Who determined which of his notes were to be put into the notebook, Exhibit 16, and which were not?
- A. He did.
- Q. Was it at his complete discretion?

A. I don't recall. I believe it was his practice, which was pretty good, to make notes while he was on the bench on looseleaf paper and then transfer intermediate, but significant milestones, into the book; and I would be the last to assert that that was what always happened.

Q. Now, you were concerned prior to May of 1967, were you not, with insuring that a proper orderly record of the TV game development was kept?

A. Yes, I was.

Q. Did you examine his notebook entries to make sure that they were in compliance with your effort for an orderly record of the TV game development?

A. Yes, I did.

Q. Did you compare the entries in the notebook with the other notes that he made on the looseleaf paper to make sure that his entries in the notebook were complete?

A. I would say that that is fair to answer affirmatively.

Q. Did you do it on a regular basis?

A. Yes, Mr. Welsh, during most of this effort I was physically present in the same lab for at least a small part of every day, so I knew what was going

on and there was constant discussion between us.

Q. I see we are past five o'clock; before we adjourn, I wonder, is the company policy in writing?

A. Yes.

Q. Could we see a copy of it?

A. I don't know whether the company redbook is restricted or not. I would have to check into that.

MR. WILLIAMS: We will have to check into that. We don't know if we would have the policy for back in 1967. We will see what is available and try to give you the answer tomorrow, if we can.

MR. WELSH: Shall we adjourn until 9:30 tomorrow, then.

(Whereupon, the deposition in the above-entitled matter was adjourned at 5:10 p.m.)

Ralph H. Boder
Dependent

THE STATE OF NEW HAMPSHIRE)
COUNTY OF Hillsborough) SS.

Subscribed and sworn to before me this 10th
day of May 19 76.

Marilyn E. Troop
~~Justice of the Peace and/or~~
Notary Public

Marilyn E. Troop
Notary Public
My Commission Expires March 19, 1980

EXHIBITS

<u>No.</u>	<u>Page</u>	<u>Description</u>
Exhibit 24	54	R. H. Baer bread board No. 1.

A. A control which adjusts the phase of the chroma generator. It is implicit in the drawing, but it isn't shown. Is it not?

52 Q. Referring now to paragraph 2B of Exhibit 9-3, would

53 you tell us specifically how the apparatus of 1018?

A. Exhibit 16-4A was intended to be used to play that

57 Q. game? playing of the board game of paragraph 2B

A. Yes, sir. 2B refers to board games, board skill games; that is, classes of games like checkers,

chess, dominoes. We, over the years, have played

A. a large variety of what we call checker board games in which an overlay, some transparent type if placed

59 Q. over the screen to define the playing field, a checker board, and in which the symbols, dots,

A. are moved over that checkerboard field in accordance with some predescribed set of rules; that is what

I had in mind there. That. There is no indication

53 Q. Is the checker board field depicted on Exhibit 16-4A?

59 A. Yes, sir. nothing shown on Exhibit 16-4A, is there,

54 Q. And that was intended to be presented there by way of an overlay on the screen?, as coin

A. Yes. there isn't.

55 Q. Now, in the playing of such board games using

indicate what symbology you were working toward?

A. Yes, it does, Mr. Welsh.

Q. What symbology was that?

A. Two types, either a vertical bar or a rectangular dot or spot.

Q. Did you have any other specific objectives?

A. Not that I recall.

Q. Was it possible with the Heath Kit by itself to put symbology on the screen?

A. No, sir.

Q. The Heath Kit had a chroma generator, is that correct?

A. The Heath Kit has a chroma generator.

Q. And is that Heath Kit Model IG-62 referred to on Exhibit 19?

A. Yes, sir.

Q. Did the chroma generator play any part in the objectives which you had in mind when you were doing this work?

A. Yes, it did.

Q. What did it have to do with the objectives?

A. From the start, we conceived of using color for TV games and the chroma generator in the Heath Kit

simply eliminated the need to build an oscillator.

23 Q. Did you have any particular objective in mind for the use of color at this time?

A. Yes, sir.

24 Q. What was that objective?

A. Well, among other things, such ideas as were put down under heading 2A in Document 9-3.

25 Q. What part of paragraph 2A of Exhibit 9-3 did you have in mind specifically with respect to color?

A. Creating colored backgrounds or colored symbols and varying the color as a function of some manual or mechanical control.

26 Q. Are you familiar with the use of a color bar generator in television servicing?

A. Yes, I am.

27 Q. Could you tell us what that is and how it operates?

A. The IG-62, of course, is such a generator and

28 Q. its purpose is to allow displays or patterns, static patterns on the screen, which in turn allows the adjustment of such semiadjustable controls

A. as vertical size, linearity, horizontal size, linearity *

29 Q. on a TV set to be moved for optimum display for

A. greatest linearity of a TV set. That is the purpose

Q. And 9-16 is a continuation of 9-15?

A. Yes.

Q. Did you have anything to do with the design of the Heath Kit generator?

A. No, sir.

Q. When did you first become familiar with the Heath Kit generator?

A. I don't remember.

Q. Was that available during your earlier training in television?

A. I don't remember, probably not.

Q. Was it prior to the time you got the ideas for the TV game?

A. I don't remember that either.

Q. How did you first become familiar with the Heath Kit generator?

A. I don't recall, but certainly it is advertised in the magazines which engineers read, or it was.

Q. Do you have even a rough idea as to when you first became familiar with it? We are talking now about the period at the end of December, 1966, when you actually purchased one.

A. Well, crosshatched generators of that type were

- A. of the bar with the horizontal centering control
Q. on the TV set to which the Heath Kit generator was
A. attached? low. It would seem that way since the
A. You might get a quarter inch or half inch or that
three-quarter inch displacement by moving vertical
Q. or horizontal centering controls, but this can be
moved from one side to the other and there is no
A. way, you can do that with centering controls. It is
Q. a matter of moving the bar 50 microseconds.
Q. Is the horizontal centering control or was the
horizontal centering control on the television
A. set similar to or different from the delay multi-
Q. vibrator shown on Exhibit 9-11?
A. I don't recall. Most horizontal centering controls
Q. nowadays are magnets on the neck of the CRT that
A. you move mechanically. That one is applied - one is
Q. But you do not recall what was the construction
of the horizontal centering control on the TV set
at that time? component values are radically
A. No, I do not.
Q. Exhibit 9-11 contains a notation schematic No. 1
with an arrow pointing toward the rectangle DMV,
Q. does it not? intended to have different functions?

only to use one multivibrator at a time?

A. That is right, that is all that is needed.

93 Q. Referring to Exhibit 9-22, do I understand correctly that that represents the chroma oscillator on the Heath Kit generator?

A. No, sir, the two tube halves on the left-hand side of the vertical dash line on this is the chroma oscillator, it is labeled V6 in the box on the top, but to the right of the dash line is a bread board we built that shows a phase shifter^a split load, RC phase shifter. It is followed by some sync injection circuits which produced a chroma 3.9 megacycle output whose phase is adjusted by the control labeled color ADJ (adjustment) on this figure. *

94 Q. When that adjustment was made, what was intended to happen?

A. What happened is that phase of the 3.59 megacycles sync signal shifts with respect to that of the oscillator, V6, and if that is applied to a standard receiver, it can be made to force the color signal on the screen to change, ~~like~~ you can go through the entire gamut of colors that way. *

it is followed by a network which has two diodes, two resistors, a switch - it may be very hard to read on your Xerox copy - and an arrow pointing to one of the resistors with the words; ~~in~~"for dots only." That is the network that changes the bias conditions such as to produce the gating effect.

208 Q. That would be an And-gate effect, would it not? *

A. I think it would be, but by dots we mean symbols.

209 Q. And those elements that you have been discussing on Exhibit 9-12 I believe you said all of these parts were parts of the Heath Kit generator?

A. That is right. I misled you, I should have said I don't know how to do that without detailed schematics. What that switch does, it comes back to me now, is to change from a crosshatch pattern to a dot pattern in the Heath Kit, so I am on the wrong track.

210 Q. Do I understand correctly, then, that this same effect is achieved with each crossing of each horizontal and vertical bar at each intersection with this and gate operative and this is why there is a dot rather than the bars extending beyond the intersection?

A. 20 December, '66, under official I R & D funding

Q. Was the request granted?

A. Yes, it was. In fact, it must have been granted before I wrote this because a task number was already listed here and task numbers are assigned by the corporate director. The task number being NDB and NDBA, which you will find on this exhibit. In fact, the file reference is NDB-1, so some other documents must have been generated before this or verbal arrangements are missing.

Q. Other than relating to TV games, does this document 9-25 have any particular relation to the other documents 9-10A through 9-23 that we have been discussing? which might plug into this spigot,

A. Yes, it appears to because on the top of 9-30 the heading is TV TY-NDB. I don't remember what the TV TY acronym stood for, but NDB is clearly the task code which is listed on 9-25. So what that says is that I was funded at the time. That I got the money just about the end of December and was able to do some of the paper work which is represented by documents 9-30, for example, 9-31,

attaching the video spigot input on circle 1 at the